Alberta Health

Tick Surveillance

2014 Summary

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Alberta Government

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Introduction

There are many species of ticks native to Alberta, for instance, moose ticks and rocky mountain spotted ticks (*Dermacentor* species). These species are not considered vectors for transmitting the bacteria that can cause Lyme disease (*Borrelia burgdorferi* sensu stricto) in humans[1]. *Ixodes* species ticks, especially *Ixodes scapularis* ticks, are capable of carrying and transmitting *B. burgdorferi* to humans[2]. The range of *Ixodes. scapularis* ticks has been expanding into Canada in the last few years and are now considered endemic in Southern Manitoba, Southern and Eastern Ontario, Southern Quebec and in the Maritimes[2]. Alberta has found *I. scapularis* ticks in small numbers in the province but, so far, they have been considered an adventitious population. This means they are present due to incursions on migratory birds and other animals but do not survive over winter and reproduce.

In 2007, Alberta Health and Alberta Agriculture and Rural Development (ARD) began a tick surveillance program to examine types of ticks found on companion animals (e.g. pet dogs), in collaboration with veterinarians in the province. In 2013, the Alberta Arthropod-Borne Diseases Committee, a collaboration of Alberta Health, ARD, Alberta Health Services, First Nations and Inuit Health Branch, and other stakeholders expanded the surveillance program to accept submissions of ticks found on humans or in the environment. ARD conducts the laboratory analysis on all* submitted ticks and manages the companion animal program.

The goal of the Enhanced Tick Surveillance Program is to assess the risk of Lyme disease in Alberta. To do this, the program uses both active and passive surveillance. "Passive surveillance" and "active surveillance" are technical terms that describe how the program acquires the samples. In passive surveillance members of the public collect and submit ticks that they find on themselves, their pets, or in the environment. Active surveillance consists of drag-sampling in grassy/bushy areas (see Figure 5 for more information). The results of passive tick surveillance are used to determine the best locations to do active tick surveillance.

The enhanced passive surveillance system can detect both established and adventitious populations. The active surveillance component helps differentiate between them. Together these surveillance activities help Alberta to determine if there is the emergence and establishment of *Ixodes* ticks in Alberta. This will help determine the level and geographical distribution of risk to Albertans if or when they establish themselves in the province in the years to come. This report outlines the findings from the second season (2014) of the Enhanced Tick Surveillance Program, and compares it to the 2013 findings.

*ARD does not analyze clinical samples submitted by physicians. Such samples are sent to the Provincial Laboratory for Public Health (ProvLab).

**_Ixodes_ species excluding _Ixodes kingi and Ixodes ochtonae_. _I. kingi I. ochtonae_ are not considered vectors for _Borrelia burgdorferi_.

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Key Findings

- Of 1,376 tick submissions, there were 137 *Ixodes*** ticks submitted, 81 of which were likely acquired in Alberta. All *Ixodes* ticks submitted were adults.
- *Ixodes* ticks were found in all health zones; 61 per cent were found in Edmonton Zone.
- Nine out of 81 *Ixodes* ticks (eleven per cent) were positive for *B. burgdorferi*. None were found on humans.
- Active surveillance did not find any *Ixodes* ticks.
- Surveillance information continues to be collected and analysis is ongoing to determine when and where to conduct targeted active surveillance in the future.

Results

The Enhanced Tick Surveillance Program analyzed 1,376 ticks in 2014. The Companion Animal Program continued to submit the majority of ticks in 2014 (n=1009), however the submissions from Human and the Environment Program increased by 77 per cent between 2013 and 2014 to 367 (Table 1).

The majority (97 per cent) of submissions (1341) were from Alberta residents. Forty-five per cent of tick submissions were from individuals who travelled outside of Alberta and likely found the tick there; 55 per cent were from Alberta residents who either did not travel or only travelled within Alberta (Table 2). Of the 1,376 ticks submitted to the program, 137 (10 per cent) were *Ixodes* ticks. Fifteen tick submissions (1 per cent) were *Ixodes* ticks positive for *B. burgdorferi*. 81 *Ixodes* ticks submitted to the program (9 of which were *B. burgdorferi*-positive) were likely found in Alberta. All *Ixodes* ticks submitted were adults.

Table 1: Ticks collected in 2013 and 2014.

	2014		2013	
	N	%	N	%
Human and the Environment Program	367	27%	207	22%
Companion Animal Program	1009	73%	753	78%
Total	1376		960	

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Table 2: Location tick likely acquired in 2013 and 2014

	2014			2013		
	All Tick Submissions	*Ixodes spp* Submissions	*Ixodes spp B. burgdorferi* positive	All Tick Submissions	Ixodes spp. Submissions	*Ixodes spp B. burgdorferi* positive
All Submissions*	1376	137	15	960	171	27
Acquired Outside Alberta**	614 (45%)	56 (41%)	6 (40%)	380 (40%)	32 (19%)	2 (7%)
Acquired In Alberta§	762 (55%)	81 (59%)	9 (60%)	580 (60%)	139 (81%)	25 (93%)
Travel within Alberta	251	21	6	202	34	4
No Travel	511	60	3	378	105	21

*In this report each tick is considered one submission. Multiple ticks could be submitted by one host at the same time.

**Includes submissions by individuals who are not Alberta residents (50) and Alberta residents that travelled outside Alberta.

§ Hosts were considered to have travelled if they answered "Yes" to one of the following questions. 2014: Humans: "Did the person travel more than 100km outside their municipality in the 2 weeks prior to finding the tick?" Animals: "Out of Alberta in the last 2 weeks?" or "Out of town, but still in Alberta, in the last 2 weeks?" 2013: Humans: "Did the human travel outside of town in the last two weeks?" Animals: "Out of town in the last 2 weeks?"

To determine the geographic distribution of ticks, a sub-analysis was performed where ticks submitted by visitors to Alberta and by residents who had travelled in the previous two weeks were excluded. Sixty *Ixodes* ticks were submitted by Alberta residents who had not travelled. While Ixodes ticks were found in all zones, the majority (n=37, 61 per cent) of *Ixodes* ticks were found in Edmonton Zone (Table 3). This is similar to the findings in 2013. *B. burgdorferi* positive ticks submitted in 2014 by non-travellers were found in Edmonton Zone and Central Zone. None of the *B. burgdorferi* positive ticks submitted in 2014 were found on humans.

Residential postal codes of the humans and animals who submitted *Ixodes* ticks and had not travelled in the past two weeks were mapped to show the geographic distribution and assist in selecting sites for active surveillance (Figure 1 – 4). Potential sites for active surveillance were identified based on visual clustering of residential postal codes in proximity to an area that could be considered suitable habitat for ticks (i.e. a natural area with mixed forest and grasslands).

Active Surveillance

Based on the 2013 passive tick surveillance results, 5 sites were selected in Edmonton Zone for active surveillance. Active surveillance was performed on four separate days at each of these sites in the spring when *Ixodes* tick submissions peak. Teams conducted drag sampling and visually inspected themselves and the drag for ticks at regular intervals (Figure 5). No ticks were found.

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Table 3: Ticks submitted from Alberta residents with no history of travel in the previous two weeks, 2014*

	Both Programs					Companion Animal Program					Human and the Environment Program				
		Ixodes spp		*B. burgdorferi* Postive			*Ixodes spp*		*B. burgdorferi* Postive			*Ixodes spp*		*B. burgdorferi* Postive	
	All Ticks	n	%	n	%	All Ticks	n	%	n	%	All Ticks	n	%	n	%
Calgary	186	5	8%	0	0%	93	4	8%	0	0%	93	1	10%	0	0%
Central	75	7	11%	1	33%	56	7	14%	1	50%	19	0	0%	0	0%
Edmonton	97	37	61%	2	66%	79	31	62%	1	50%	18	6	60%	1**	100%
North	68	10	16%	0	0%	56	8	16%	0	0%	12	2	20%	0	0%
South	84	1	1%	0	0%	64	0	0%	0	0%	20	1	10%	0	0%
Unknown	1	0		0		1	0		0						
Total	511	60		3		349	50		2		162	10		1	

Table 4: Ticks submitted from Alberta residents with no history of travel in the previous two weeks, 2013

	Both Programs					Companion Animal Program					Human and the Environment Program				
		Ixodes spp		*B. burgdorferi* Postive			*Ixodes spp*		*B. burgdorferi* Postive			*Ixodes spp*		*B. burgdorferi* Postive	
	All Ticks	n	%	n	%	All Ticks	n	%	n	%	All Ticks	n	%	n	%
Calgary	89	5	5%	0	0%	55	5	5%	0	0%	34	0	0%	0	0%
Central	47	9	9%	2	10%	39	9	9%	2	10%	8	0	0%	0	0%
Edmonton	133	72	69%	13	62%	126	69	68%	12	60%	7	3	100%	1	100%
North	64	16	15%	4	19%	57	16	16%	4	20%	7	0	0%	0	0%
South	45	3	3%	2	10%	16	3	3%	2	10%	29	0	0%	0	0%
Total	378	105		21		293	102		20		85	3		1	

*Note: This program is based on a convenience sample of submissions from volunteers. Therefore the number of ticks analyzed per zone does not necessarily correspond to the prevalence of ticks in a zone.

**Note: This *B. burgdorferi*-positive tick was found on a companion animal but submitted through the Human and the Environment Program.

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Figure 1: Residential Postal Codes of Alberta Resident Humans and Animals from which *Ixodes* Species Ticks Were Recovered and Who Had No History of Travel in the Previous Two Weeks, Alberta 2014

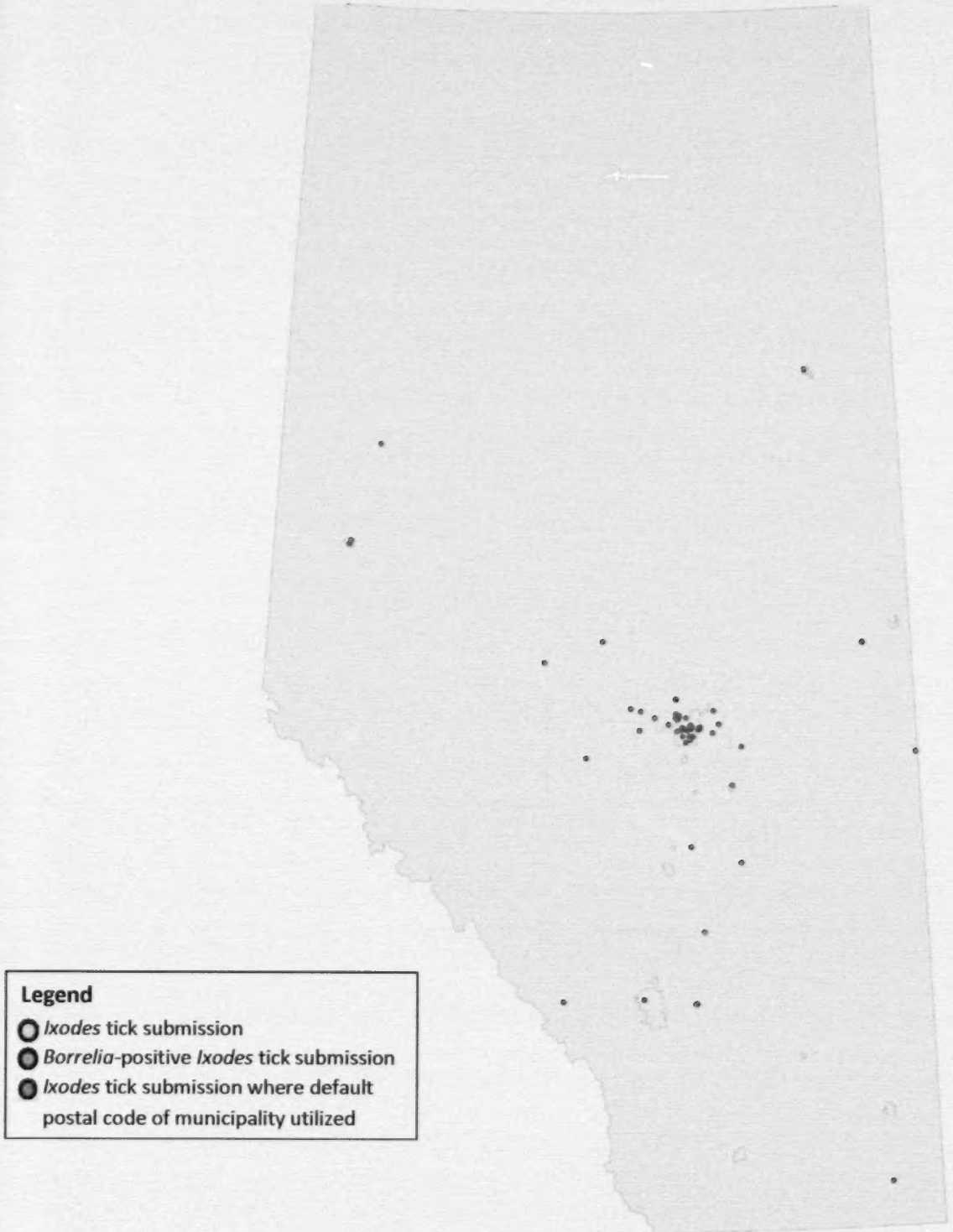
Legend
Ixodes tick submission
Borrelia-positive Ixodes tick submission
Ixodes tick submission where default postal code of municipality utilized

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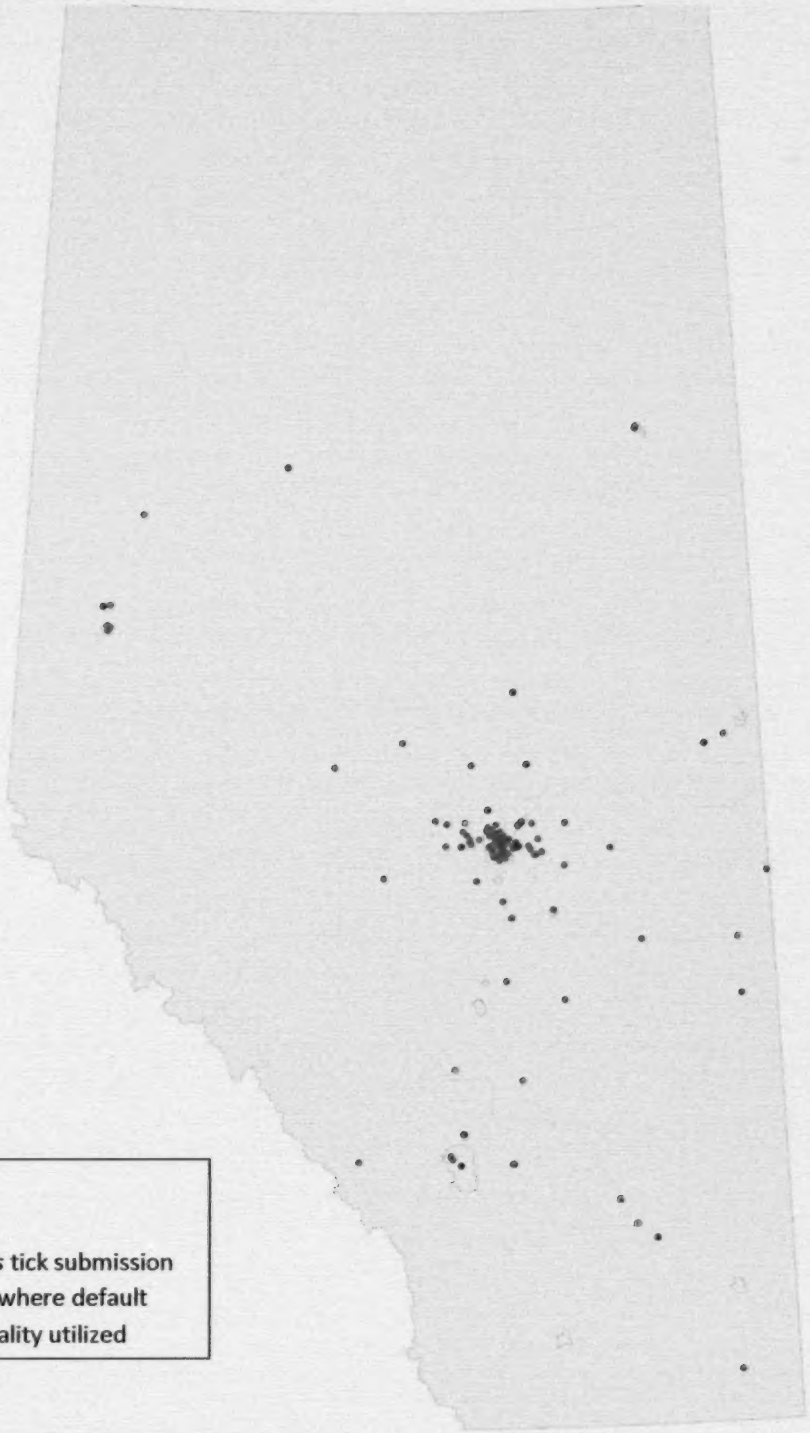
Figure 2: Residential Postal Codes of Alberta Resident Humans and Animals from which *Ixodes* Species Ticks Were Recovered and Who Had No History of Travel in the Previous Two Weeks, Alberta 2013 & 2014



Legend

- *Ixodes* tick submission
- *Borrelia*-positive *Ixodes* tick submission
- *Ixodes* tick submission where default postal code of municipality utilized

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Figure 3: Residential Postal Codes of Alberta Resident Humans and Animals from which *Ixodes* Species Ticks Were Recovered and Who Had No History of Travel in Previous Two Weeks, Edmonton Zone 2014

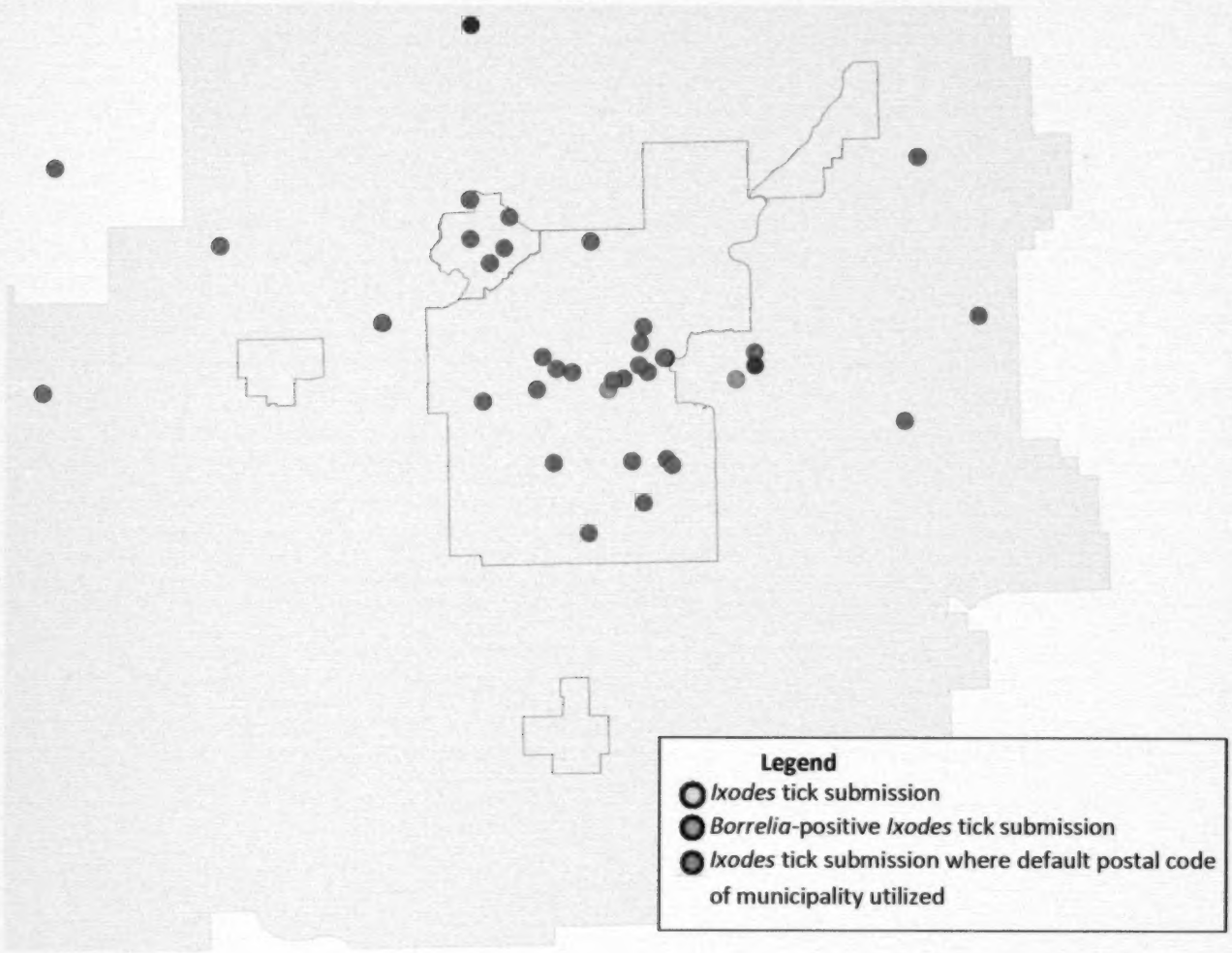
Legend
Ixodes tick submission
Borrelia-positive Ixodes tick submission
Ixodes tick submission where default postal code of municipality utilized

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Figure 4: Residential Postal Codes of Alberta Resident Humans and Animals from which *Ixodes* Species Ticks Were Recovered and Who Had No History of Travel in Previous Two Weeks, Edmonton Zone 2013 and 2014

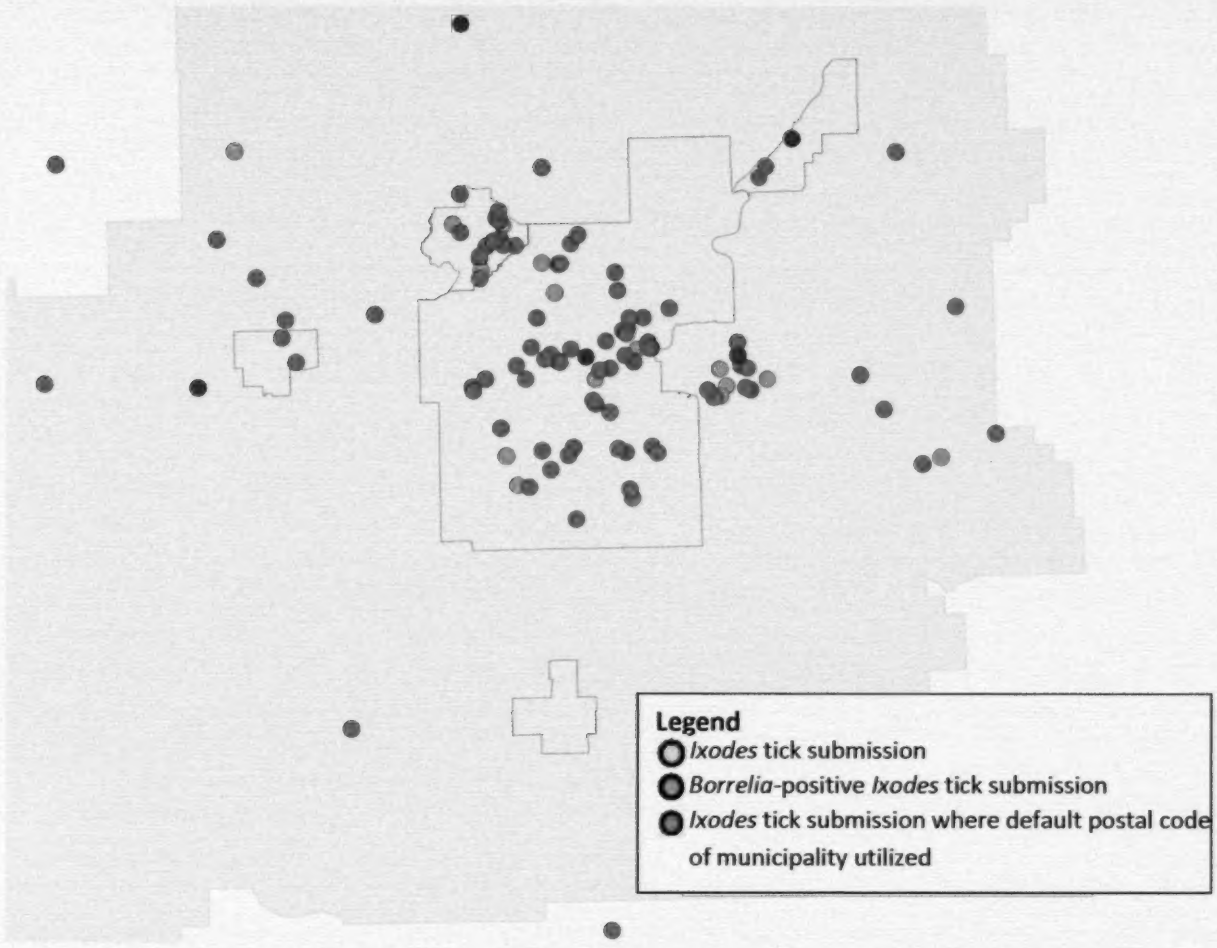
Legend
Ixodes tick submission
Borrelia-positive Ixodes tick submission
Ixodes tick submission where default postal code of municipality utilized

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Figure 5: Photographs demonstrating drag sampling taken in Fall 2013 and Spring 2014. Teams wore white suits and dragged flannel sheets behind them for a minimum of 1.5 person-hours per site visit. They visually inspected themselves and the drags for ticks every 10m.

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Conclusion

While the number of ticks submitted this year is higher than last year, the number of *Ixodes* species ticks and *B. burgdorferi* positive ticks submitted to the program this year is lower. The unseasonably cold spring Alberta experienced in 2014[3] may have been related to the low number of *Ixodes* ticks found, as *Ixodes* ticks are more active in warm weather.

As only adult ticks were found and ticks were not found during active surveillance, it appears that Ixodes ticks have not become established in Alberta at this time. It appears that the ticks submitted are sporadic and carried here on migratory birds or other animals, and are not part of an established population capable of overwintering. Ongoing active and passive surveillance through the enhanced tick surveillance program will help us identify if a population of *Ixodes* ticks do become established in Alberta.

Acknowledgments

The Enhanced Tick Surveillance Program is a collaborative effort between Alberta Health, Alberta Agriculture and Rural Development, Alberta Health Services, Provincial Laboratory of Alberta, and the Alberta Arthropod-Borne Diseases Committee (AABDC). We would also like to acknowledge the City of Edmonton for their invaluable assistance in performing active tick surveillance.

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